

AMENDMENTS TO THE CLAIMS

Claims 1-35 (Canceled)

Claim 36 (New) Method for the protection against leakage currents generated in the supply of a load (16) connected to an electrical network (10), comprising the phases of:

- (i) obtaining a zero-reference value by acquiring one or more times a signal (90u) proportional to the leakage current without generating test leakage currents;
- (ii) generating a test leakage current and acquiring a corresponding signal (90u) proportional thereto as test-value;
- (iii) detecting the actual leakage currents and generating a signal (90u) proportional thereto;
- (iv) acquiring a signal (90u) proportional to the actual leakage currents and disconnecting the load (16) from the electrical network (10) when reaching a dangerous condition corresponding to an acquired signal (90u) of a magnitude greater than a limit value.

Claim 37 (New) Method according to claim 36, wherein the phases (i) and/or (ii) are performed before connecting the load (16) to the network (10).

Claim 38 (New) Method according to claim 36, wherein the phases (i) and/or (ii) are performed verifying that such a signal (90u) be comprised in a pre-established range.

Claim 39 (New) Method according to claim 36, further comprising the phase of cyclically verifying, after the connection of the load (16) to the network (10), the regular detection of leakage currents by generating at least a test current.

Claim 40 (New) Method according to claim 36, wherein the limit value is obtained by taking the absolute value of the difference between the zero-reference value and the test-value.

Claim 41 (New) Method according to claim 40, further comprising the phase of disconnecting the load (16) from the network (10) whenever, during the phase of cyclical verifying of the regular detection of leakage currents, the maximum in modulus of the magnitude of the acquired proportional signal (90u) is greater than the sum of the limit-value and the zero-reference value.

Claim 42 (New) Method according to claim 36, further comprising the phase of detecting the current in at least a conductor connected to the load (16) and disconnecting the same load (16) whenever said current is greater than a pre-established threshold.

Claim 43 (New) Method according to claim 42, wherein the phase of detecting the current in at least a conductor connected to the load (16) is performed before and/or after the connection of the load (16) to the network (10).

Claim 44 (New) Method according to claim 36, wherein during a dangerous condition the load (16) is disconnected from the network (10) by means of a controlled switch (20) which is forced open until the same switch (20) is disconnected from the network (10).

Claim 45 (New) Apparatus (1) for performing the method according the preceding claims, comprising

- an electrically controlled switch (20) set between the network (10) and the load (16), which disconnects the load (16) from the network (10) when open and connects it when closed;
- detecting means (30) for leakage currents that generate a signal proportional to the same leakage currents;
- a generator circuit (40) able to generate a test leakage current,
- an elaboration unit (50) connected with the detecting means (30) to acquire said proportional signal, with the generator circuit (40) for the control thereof, and with the switch (20) to drive its opening with a control signal (38) whenever a dangerous condition is met;

characterized in that the elaboration unit (50) is adapted to perform at start-up an acquisition of a zero-reference value by reading the detecting means (30) without generating test leakage currents, to generate a test leakage current by driving the generator circuit (40) and to acquire a corresponding signal (90u) proportional thereto as test-value; then the elaboration unit (50) is further adapted to acquire a signal (90u) proportional to the actual leakage currents and to disconnect the load (16) from the electrical network (10) when reaching a dangerous condition corresponding to an acquired signal (90u) of a magnitude greater than a limit value.

Claim 46 (New) Apparatus according to claim 45, further comprising a circuit generating a stabilized power supply for said elaboration unit (50), said circuit being supplied from the electrical network (10).

Claim 47 (New) Apparatus according to claim 45, wherein the detecting means (30) for leakage currents comprise a differential transformer (30) having a core on which there are provided a primary winding constituted by conductors (12, 14) supplying the load (16), and a secondary winding (32) which generates a signal proportional to the current flowing into the primary winding.

Claim 48 (New) Apparatus according to claim 45, wherein the generating circuit (40) comprises a resistor (86) in series with a triac (88) whose conduction is controlled by a signal (36) generated by the elaboration unit (50), said series shunting the conductors (12, 14) supplying the load (16) with a terminal downstream and a terminal upstream the detecting means (30).

Claim 49 (New) Apparatus according to claim 45, wherein said elaboration unit (50) drives visual (112, 114) and/or acoustical warnings.

Claim 50 (New) Apparatus according to claim 45, wherein said elaboration unit (50) is provided with timing means (28, 29) adapted to scan the cyclical control of the magnitude of the leakage current before and/or after the make of the switch (20).

Claim 51 (New) Apparatus according to claim 45, wherein said elaboration unit (50) is provided with an arithmetic module adapted to compare the value acquired by the detecting means (30) for leakage currents with pre-established or acquired in real time values.

Claim 52 (New) Apparatus according to claim 51, wherein said pre-established values are stored in a ROM inside the elaboration unit (50).

Claim 53 (New) Apparatus according to claim 45, characterized in that it further comprises detecting means (300, 3001) for currents in at least a conductor connected to the load (16), said means (300, 3001) generating a signal proportional to said currents and being connected to said elaboration unit (50) to control the tripping of the switch (20) when a dangerous condition is met.

Claim 54 (New) Electrical appliance provided with a plug (55) for connecting the appliance to an electrical network (10), characterized in that it comprises a protection apparatus (1) according to claim 45.

Claim 55 (New) Appliance according to claim 54, being a hair-dryer or any other household electrical apparatus.

Claim 56 (New) Socket for supplying electrical appliances, comprising a protection apparatus (1) according to claim 45.

Claim 57 (New) Method according to claim 37, wherein the phases (i) and/or (ii) are performed verifying that such a signal (90u) be comprised in a pre-established range.

Claim 58 (New) Method according to claim 37, further comprising the phase of cyclically verifying, after the connection of the load (16) to the network (10), the regular detection of leakage currents by generating at least a test current.

Claim 59 (New) Method according to claim 38, further comprising the phase of cyclically verifying, after the connection of the load (16) to the network (10), the regular detection of leakage currents by generating at least a test current.

Claim 60 (New) Method according to claim 57, further comprising the phase of cyclically verifying, after the connection of the load (16) to the network (10), the regular detection of leakage currents by generating at least a test current.

Claim 61 (New) Method according to claim 37, wherein the limit value is obtained by taking the absolute value of the difference between the zero-reference value and the test-value.

Claim 62 (New) Method according to claim 38, wherein the limit value is obtained by taking the absolute value of the difference between the zero-reference value and the test-value.

Claim 63 (New) Method according to claim 57, wherein the limit value is obtained by taking the absolute value of the difference between the zero-reference value and the test-value.

Claim 64 (New) Method according to claim 61, further comprising the phase of disconnecting the load (16) from the network (10) whenever, during the phase of cyclical verifying of the regular detection of leakage currents, the maximum in modulus of the magnitude of the acquired proportional signal (90u) is greater than the sum of the limit-value and the zero-reference value.

Claim 65 (New) Method according to claim 62, further comprising the phase of disconnecting the load (16) from the network (10) whenever, during the phase of cyclical verifying of the regular detection of leakage currents, the maximum in modulus of the magnitude of the acquired proportional signal (90u) is greater than the sum of the limit-value and the zero-reference value.

Claim 66 (New) Method according to claim 63, further comprising the phase of disconnecting the load (16) from the network (10) whenever, during the phase of cyclical verifying of the regular detection of leakage currents, the maximum in modulus of the magnitude of the acquired proportional signal (90u) is greater than the sum of the limit-value and the zero-reference value.

Claim 67 (New) Method according to claim 37, wherein during a dangerous condition the load (16) is disconnected from the network (10) by means of a controlled switch (20) which is forced open until the same switch (20) is disconnected from the network (10).

Claim 68 (New) Electrical appliance provided with a plug (55) for connecting the appliance to an electrical network (10), characterized in that it comprises a protection apparatus (1) according to claim 46.

Claim 69 (New) Electrical appliance provided with a plug (55) for connecting the appliance to an electrical network (10), characterized in that it comprises a protection apparatus (1) according to claim 47.

Claim 70 (New) Electrical appliance provided with a plug (55) for connecting the appliance to an electrical network (10), characterized in that it comprises a protection apparatus (1) according to claim 48.

Claim 71 (New) Electrical appliance provided with a plug (55) for connecting the appliance to an electrical network (10), characterized in that it comprises a protection apparatus (1) according to claim 49.

Claim 72 (New) Electrical appliance provided with a plug (55) for connecting the appliance to an electrical network (10), characterized in that it comprises a protection apparatus (1) according to claim 50.

Claim 73 (New) Electrical appliance provided with a plug (55) for connecting the appliance to an electrical network (10), characterized in that it comprises a protection apparatus (1) according to claim 51.

Claim 74 (New) Electrical appliance provided with a plug (55) for connecting the appliance to an electrical network (10), characterized in that it comprises a protection apparatus (1) according to claim 52.

Claim 75 (New) Electrical appliance provided with a plug (55) for connecting the appliance to an electrical network (10), characterized in that it comprises a protection apparatus (1) according to claim 53.

Claim 76 (New) Appliance according to claim 68, being a hair-dryer or any other household electrical apparatus.

Claim 77 (New) Appliance according to claim 69, being a hair-dryer or any other household electrical apparatus.

Claim 78 (New) Appliance according to claim 70, being a hair-dryer or any other household electrical apparatus.

Claim 79 (New) Appliance according to claim 71, being a hair-dryer or any other household electrical apparatus.

Claim 80 (New) Appliance according to claim 72, being a hair-dryer or any other household electrical apparatus.

Claim 81 (New) Appliance according to claim 73, being a hair-dryer or any other household electrical apparatus.

Claim 82 (New) Appliance according to claim 74, being a hair-dryer or any other household electrical apparatus.

Claim 83 (New) Appliance according to claim 75, being a hair-dryer or any other household electrical apparatus.

Claim 84 (New) Socket for supplying electrical appliances, comprising a protection apparatus (1) according to claim 46.

Claim 85 (New) Socket for supplying electrical appliances, comprising a protection apparatus (1) according to claim 47.

Claim 86 (New) Socket for supplying electrical appliances, comprising a protection apparatus (1) according to claim 48.

Claim 87 (New) Socket for supplying electrical appliances, comprising a protection apparatus (1) according to claim 49.

Claim 88 (New) Socket for supplying electrical appliances, comprising a protection apparatus (1) according to claim 50.

Claim 89 (New) Socket for supplying electrical appliances, comprising a protection apparatus (1) according to claim 51.

Claim 90 (New) Socket for supplying electrical appliances, comprising a protection apparatus (1) according to claim 52.

Claim 91 (New) Socket for supplying electrical appliances, comprising a protection apparatus (1) according to claim 53.